



January 2017

## Agricultural Research Partnerships (ARP) Network NOTES

Welcome to ARP Network Quarterly Notes! Our goal is to keep you informed about ARP Network and Agricultural Research Service's current information. We hope that the notes build networking opportunities for businesses to connect with ARP Network Members.

***Please help us spread the word by sharing ARP Network Notes statewide with your company contacts, colleagues, other organizations, etc. Thank you!***

### ARS

The Agricultural Research Service (ARS) is USDA's primary internal research agency. ARS conducts research to develop and transfer solutions to major agricultural problems that are both national and international in scope. ARS has nearly 2,000 scientists nationwide and a few in overseas locations. ARS scientists carry out 750 research projects on a variety of subjects. ARS has a Congressional mandate to disseminate the research findings of these projects to the American public and other interested parties. Learn more by visiting: <http://www.ars.usda.gov>.

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### ARP Network

The ARP Network enlists the help of partners to spark economic development, entrepreneurship and community development. USDA ARS founded the ARP Network in an effort to expand the impact of ARS research and provide resources to help companies grow. By combining ARS research expertise with complementary capabilities and talents of partnering organizations, the ARP Network helps stimulate economic growth through technological advancements. The ARP Network matches business needs with ARS innovations and research capabilities and provides business assistant services to help companies and startups solve agricultural problems, develop products and create new jobs. Learn more by visiting: <https://www.ars.usda.gov/business/Docs.htm?docid=24715>.

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### Are You Planning a Round-Table, Webinar or Other Event in your State?

If you are planning an event in your area, please keep ARS in mind. ARS covers many agricultural topics and may be able to provide event speakers or participants to engage in discussions. ARS is organized into four main program areas: Nutrition, Food Safety, and Quality; Natural Resources and Sustainable Agricultural Systems; Crop Production and Protection; and Animal Production and Protection. Please contact Cathy Cohn: [cathleen.cohn@ars.usda.gov](mailto:cathleen.cohn@ars.usda.gov)

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## USDA Releases Annual Technology Transfer Report

The USDA released its annual Technology Transfer Report. This report shows that USDA researchers entered into over 14,000 collaborative research agreements and submitted 222 new invention disclosure for possible patenting. USDA was awarded 94 new patents, submitted 125 new patent applications and signed 35 new licenses. The report highlights the year's downstream outcomes for USDA research projects. View the report at: [https://www.ars.usda.gov/ARSUserFiles/ott/FY15-TT\\_9-30.pdf](https://www.ars.usda.gov/ARSUserFiles/ott/FY15-TT_9-30.pdf)

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## ARS Partnership and/or Licensing Opportunities

### Starch Amine Complexes for Increased Water Resistance of Paper

Methods for increasing the hydrophobic, water-repelling properties of the surface of a cellulosic article such as paper, cotton or cotton blends. Complexes that are prepared from natural products are applied to cellulosic material form a water resistant coating that retards water penetration. The complexes are environmentally friendly, water soluble and prepared from low cost corn/rice starch. The process could be used in conjunction with current paper sizing equipment. ARS docket no. 96.15. Please contact Renee Wagner: [renee.wagner@ars.usda.gov](mailto:renee.wagner@ars.usda.gov)

### Novel Oil Having Antibacterial Activity

Liamocins produced by certain strains of the fungus *Aureobasidium pullulan* have anti-bacterial activity with specificity for *Streptococcus* spp., *Enterococcus* spp., and *Bacillus* spp. The invention includes methods of using the liamocins and compositions containing modified liamocins to kill bacteria. This invention also relates to methods to produce modified liamocins with specific head groups. The liamocins produced could be used as a dairy cattle dip for prevention of mastitis or as a tropical antibacterial treatment. In more refined forms, the pharmacologically active component(s) of the liamocins have potential to be incorporated into injectable or oral medicines. Liamocins are chemically different than conventional antibiotics, and cross-resistance should be minimal. They may be effective for *Streptococcus* infections that do not respond to conventional antibiotic therapy. The liamocins are produced from low-cost agricultural biomass substrates, particularly pretreated wheat straw. ARS docket no. 107.13. Please contact Renee Wagner: [renee.wagner@ars.usda.gov](mailto:renee.wagner@ars.usda.gov)

### Transplanter for a Walk-Behind Tractor

The transplanter is a self-propelled walk-behind tractor for no-till and/or organic vegetable small scale market farms and gardens. The transplanter is designed to help small farmers transplant vegetables and other seedling vegetables and to ensure good root system-to-soil contact. It can be adapted to small scale tractors and only one person is needed to simultaneously operate the transplanter and drive the walk-behind tractor. The transplanter can be configured to plant more than one row simultaneously. ARS docket no. 187.16. Please contact Tommy Valco: [thomas.valco@ars.usda.gov](mailto:thomas.valco@ars.usda.gov)

### Sorghum Yield Enhancement Gene

Global demand and consumption of grain crops for food, feed and fuel is increasing at a rapid pace. This demand has expanded for many years and is expected to continue to increase as human population

increases. This invention relates to multi-seed sorghum mutants (MSD1) which develop seeds at not only the sessile spikelets of the panicles, but also at the pedicellate spikelets, thereby significantly increasing the seed production and yield. The results of the MSD1 mutant show potential as a resource for increasing grain yield as a parent to use for crosses. Further details are in U.S. Patent App. Publication No. 2014-0068798. ARS Docket No. 222.13. Please contact Jeff Walenta: [Jeffrey.Walenta@ars.usda.gov](mailto:Jeffrey.Walenta@ars.usda.gov)

### **Mutant Sorghum Bicolor Having Enhanced Seed Yield**

This invention relates to a novel mutation in a sorghum gene which further increases the seed yield in sorghum. Specifically, genetically altered sorghum plants expressing the multi-seeded 2 (MSD2) phenotype and genotype contain one of two genomic alterations which result in the activity of an encoded protein. These alterations result in an increased number of seeds and seed weight, thus increasing the yield. These alterations can be generated in ortholog genes in maize (TS1), rice, barley, and other monocot plants, generating the MSD2 phenotype. Further details are in U.S. Patent App. Publication No. 2016-0289696. ARS Docket No. 52.14. Please contact Jeff Walenta: [Jeffrey.walenta@ars.usda.gov](mailto:Jeffrey.walenta@ars.usda.gov).

### **A Method for Controlling Fungal Plant Pathogens Using a Combination of UV Radiation Followed by Antagonist Application and Dark Period**

Strawberries are available year-around from production in the field or from controlled environments (e.g. high and low tunnel culture and greenhouse). Diversity of production conditions results in challenges in controlling diseases before, during, and after harvest. Fungicides, traditionally used to control diseases have limitations. ARS has developed a method to control fungal plant pathogens by UV-C irradiation followed by a dark period. The method kills two major pathogens of strawberry, *Botrytis cinerea* and *Colletotrichum acutatum*. The UV-C irradiation and dark period is followed by repopulation with beneficial biocontrol microorganisms. This combination protocol makes it possible to use a lower dose of UV-C for reduction and/or elimination of pathogens. A mobile treatment apparatus was designed to provide the appropriately timed UV-C doses, dark period, and sprayable doses of biocontrol microorganisms. The UV-C dose and repeated exposure did not affect pollen germination or cause chlorophyll degradation in strawberry leaves. This invention would be ideal for high tunnel production. U.S. Patent App. Publication No. 2015-0283276. ARS Docket No. 32.13. Please contact Jim Poulos: [jim.poulos@ars.usda.gov](mailto:jim.poulos@ars.usda.gov)

### **Method for Bed Bug Control**

A low oxygen treatment method for bed bug control. The method comprises placing a bed-bug contaminated object in a sealable enclosure and establishing reduced oxygen (<3%) conditions for an amount of time sufficient to control bed bugs. It is an environmentally friendly method that does not rely on heat, pesticides or insecticides. ARS Docket 2.14. Please contact David Nicholson: [david.nicholson@ars.usda.gov](mailto:david.nicholson@ars.usda.gov)

### **Development of Feed-Admixed Immunity Stimulating Bacterins for Decreasing Serovar Group D *Salmonella* in Poultry**

A feed-admixed immunity stimulating (FAIS) bacterin is a killed preparation of cells made from pathogenic bacteria that is mixed into a component of feed and fed on a recurring basis to a host to stimulate immunity. ARS plans on developing a bacterin for reducing *Salmonella enterica* serovar Group D1 in poultry

that is formulated for safe and efficacious use by the hobbyist as well as the commercial producer. ARS will further explore efficacy of FAIS bacterins in combination with vaccination by injection. FAIS bacterins are intended to both reduce contamination of poultry products and prevent disease in chickens. AIM 1 is to establish baselines for using FAIS bacterins to reduce organ invasion and/or colonization of chickens by *Salmonella enterica* serovar Enteritidis and to refine formulation. AIM 2 is to assay immunological changes in chickens in order to identify host responses that correlate with efficacy of the FAIS bacterin. ARS scientist seeks a partner for developing this technology. Interested parties please contact Cathy Cohn: [cathleen.cohn@ars.usda.gov](mailto:cathleen.cohn@ars.usda.gov)

### **Software for Variable-Rate Nitrogen Management in Dryland Wheat Grown Under Low Precipitation**

ARS has developed a series of MS-Excel routines for developing site-specific nitrogen (N) prescriptions for dryland wheat fields. Together these routines allow for editing of site-specific grain protein and yield data, and utilize maps of grain protein and yield to map the amount of nitrogen (N) removed at time of harvest. The approach also includes combining the N removal map with the fertilizer N equivalent to a unit change in grain protein concentration and targeting critical protein level where N is sufficient for yield. This software when refactored with suitable user interface could allow growers to use yield and protein maps obtained with on-combine sensing equipment to estimate crop N removal and vary N in fields at the rate it was removed by the previous crop and target a desired protein level in the next crop. There is little need for grid soil sampling or other spatial information for constructing management zones and developing site-specific fertilizer prescriptions. Also, the approach overcomes limitations of optical methods initially developed in the Midwest that do not work well in semiarid environments where crop yields are limited by lack of water. Finally, the software enables the development of site-specific N prescriptions that avoid over-application of N, reduced yield and excessive protein. ARS scientist seeks a partner to further develop this technology. Interested parties please contact David Nicholson: [david.nicholson@ars.usda.gov](mailto:david.nicholson@ars.usda.gov)

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## **ARS Available Software**

### **A System Tool to Evaluate the Effects of Agricultural Management Practices on Crop Production and Environmental Impacts under Current and Climate Change Conditions**

The USDA-ARS Root Zone Water Quality Model (RZWQM) was developed and is available on the USDA-ARS website (<https://www.ars.usda.gov/research/software/download/?softwareid=412&modecode=30-12-20-00>). It has been applied to assess water use and environmental impacts of agronomic practices worldwide for the past 20 years. Management practices evaluated include irrigation, fertilization, manure management, pesticide application, crop rotation, controlled drainage, and tillage. Environmental impacts simulated are N leaching, ammonia volatilization, greenhouse gas emission, soil carbon sequestration, and pesticide fates. The model has been used as a decision support tool for irrigation scheduling and N recommendation in several countries under current and future climate conditions.

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## Available Technologies for Licensing

Each year, approximately 60 new patents are issued by the U.S. Patent Office for USDA inventions. The Office of Technology Transfer (OTT) transfers these inventions through licenses to the private sector for commercialization. Here is a link to *recently filed* U.S. patent applications that are available for licensing. This list is updated monthly so check back often! <http://www.ars.usda.gov/Business/Business.htm>

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## ARS Digital Online Research Magazine

*AgResearch* is a monthly publication highlighting short features on the scientific research discoveries occurring at all of ARS' research laboratories across the Nation and abroad. View *AgResearch* at <http://agresearchmag.ars.usda.gov>. One can subscribe to electronic delivery of the magazine on the website.



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## USDA Blog

Check out USDA Blog site for updates on Agricultural issues (<http://blogs.usda.gov>). One can sign up for email updates on the website by checking boxes of categories of interest including the blog, news categories and social media.

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*We are seeking contributions for future ARP Network Notes from members who wish to share information that would be of interest to the group. Suggestions include events, Ag challenges and community initiatives. For ideas of content for future notes, please contact Cathy Cohn at [cathleen.cohn@ars.usda.gov](mailto:cathleen.cohn@ars.usda.gov).*

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Get more information: [www.ars.usda.gov](http://www.ars.usda.gov)

